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New, balanced approach calculates lifetime solar energy cost

ARGONNE, Ill. (Feb. 7, 2011) – Researchers at the U.S. Department of Energy's (DOE) Argonne National Laboratory in partnership with an analyst at Gartner, Inc. have developed a new and more instructive approach to calculate the lifetime cost for a solar-generated energy system for comparison to other energy systems.

Usually when people consider the cost of solar energy, they use the dollars per Watt metric, which is only a measure of the initial capital cost and the solar panel vendor's performance specification. This doesn't take into account the actual energy you will get from the system or other cost factors such as maintenance. A far more informative metric is the levelized cost of energy (LCOE).

"In typical LCOE projections for solar energy, many assumptions are swept under the rug, and we wanted to make a small step toward lifting up that rug and showing how you can truly get a handle on those assumptions to develop a more accurate picture of the potential costs," said Argonne solar researcher Seth Darling, who leads the development of the new approach. LCOE is the cost of an energy supply over its lifetime per energy unit produced.

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"Specifically, the Argonne approach uses a Monte Carlo simulation that statistically selects from probability distributions to account for the uncertainty associated with various cost and production parameters," Darling said. A Monte Carlo simulation can produce millions of possible performance outcomes that might occur in the future, weighted to reflect their likelihood.

A variety of stakeholders, including investors and policymakers, are tracking the generational development and commercialization of solar technologies and require greater insight into the projected costs of a solar energy project to aid in decision making.

"Investors need to know their expected return on investment, regulators and policy makers help define the economies of energy productions and require reliable information, funding agencies need a means to analyze proposed technology development, and technology developers want to understand how they will compete relative to other technologies," according to a new paper published by the researchers.

Argonne's optimized approach to calculating the LCOE for photovoltaics will provide each group with better guidance. However, implementing this approach will require development of more rigorous data sets of location-specific solar panel performance and other parameters. Fair comparison to traditional energy sources, such as coal or natural gas, will require a re-examination of the hidden costs associated with those technologies.

The new methodology is presented in the paper "Assumptions and the levelized cost of energy for photovoltaics" in *Energy & Environmental Science*. The lead author of the paper is Seth Darling. Argonne researchers Fengqi You and Thomas Veselka and Gartner analyst Alfonso Velosa are co-authors.

DOE's Office of Science provided funding for this research.

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